MANITOBA

DEPARTMENT OF LABOUR

Office of the Fire Commissioner

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FIRE DETECTION PROCEDURES

The Office of the Fire Commissioner in Manitoba is commissioned with the investigation of fires and suppression of arson. In order to accomplish this, we have three full-time investigators working out of our Winnipeg Office and one located in our Brandon Regional Office. We are primarily called upon to investigate fires by Fire and Police authorities. We also answer calls by insurance adjusters or companies if there is sufficient reason for suspecting the cause of a fire.

Often when our office is called by the R.C.M.P. or Municipal Police the call is received during or shortly after the fire has been extinguished and as soon as any suspicious circumstances have become apparent. Calls from the insurance industry are usually received some time after the fire.

Investigations originate with the fire department. They are the first on the scene and the first to become aware of suspicious circumstances. Often, failure in an investigation will occur if fire fighters unwittingly dispose of evidence, fail to note whether the building was secure upon their arrival or fail to request an investigation.

Our office makes every effort to work closely with the police authorities at all times. We feel that the greatest success is achieved when both Police and Fire Investigators work together on all aspects of the investigation. Our role, however, is directed toward the establishing of the origin and cause of the fire.

There is some lack of definition as to when and how the police are to be notified and when they are to enter into an investigation. We find that the majority of Fire Chiefs call for the local police authority who in turn will call, if necessary, our Office and request the attendance of a fire Investigator. Complete cooperation with your local police authority will determine who calls for a fire Investigator, you or the Police.

The Investigator does not respond to the fire scene until summoned. Upon his arrival he is unfamiliar with the conditions and circumstances under which the fire occurred. In addition, the persons and property involved are unknown so the investigator relies on members of the fire and police officials to be his source of information.

What information should be available from the fire fighters? This will come under three categories:

1. that type of information attainable or developed prior to the arrival on the fire scene,

2. the information available to the fire fighters at the fire scene, and

3. the type of information that becomes available during overhaul and thereafter.

Before Arrival

The time of the receipt of the alarm is a most important factor. The time, day of the week, can all be significant in a fire investigation. If a business concern is involved, its personnel may assist in establishing how long the place was closed before the fire was discovered. Who was the last person to leave the premises? Did the fire occur during or after school hours? Was it during the daylight hours or at night? Were there likely to have been witnesses in the vicinity? What was the normal type of traffic in the area at that time?

Weather conditions can be another important factor. Rain, electrical storms, snow, sleet, ice, wind, humidity, and atmospheric inversion, all can have an effect upon the fire. The presence or absence of an electrical storm will determine whether lightning can be eliminated as the cause of the fire.

Upon approaching the fire scene, the fire fighter should observe any person or automobile hurriedly leaving the area. If the fire is blazing at all, it is most natural for people to be attracted by it. Careful mental notes about them or identifying characteristics of persons or vehicles leaving the scene may be of great value to the investigator. Some other conditions that should be noted are unusual road or street conditions, such as barricades slowing the progress of the response, or vehicles parked in such a manner as to create obstructions to the fire scene, hydrants, sprinkler connections, streets or driveways.

The colour of smoke and of flames can be a rather reliable indicator of the type of fire. Some of the more common of these indicators are:

1. Black smoke with deep red flames - petroleum products, tar, rubber, many plastics, etc.

2. Heavy brown smoke with deep red flames - nitrogen products.

3. White smoke with bright white flames, reactive to water - magnesium.

4. Black smoke with red and blue-green flames - asphalt shingles.

5. Purple, violet, or lavender flames - potassium.

6. Greenish-yellow flames - chlorine or manganese.

7. Bright reddish-yellow flames, similar to fusee or railroad flares - calcium.

8. Smoke of the usual colour found in most fires that changes to yellow or grayish-yellow - usually indicative of a "backdraft" condition.

The smoke and flames observed just prior to the arrival at the fire scene may be of great importance.

Upon Arrival

Upon arrival at the fire scene, several different conditions should be watched for. The existence of separate, non-related, simultaneously burning fires could be of great significance, as could the extent and area of the fire. Was forcible entry necessary to gain admission to the premises? Was entrance through unlocked doors? Was there evidence that the doors had been forced before the arrival of the fire department? Fire fighters should look for marks on doors and windows that might indicate a forced entry, and notice whether tools used for this purpose have been discarded by the burglar. In one case, the fire department finally gained entrance to the office in a lumberyard fire. Fire fighters found the safe wide open and its contents lying all about. Since the fire was spreading rapidly, the fire fighters scooped up as many of the papers as possible, threw them back into the safe, and closed the safe. The building was destroyed, but the papers in the safe were salvaged. The burglarized safe was the first indication of an incendiary fire.

Account ledgers and other business records laid out on the desks in the office may be another indication of incendiarism. Destruction of business records may well be a motive for arson, particularly if the crime takes place just prior to an audit of the books. Embezzlement or a serious inventory shortage might be detected in the audit.

Had the fire spread, or was it spreading, with unusual speed? Was the fire more intense than one usually encountered in a similar occupancy? Did the fire behave naturally? Was there any unusual odour at the fire scene? Some arsonists have been known to use perfume, ammonia, or similar strong odourants to hide the smell of an accelerant. Were there any obstacles or obstructions to delay entry by fire fighters?

The windows of the building should also be observed. Shades have been drawn and paper placed over windows to keep anyone from looking into the building. This gives the fire an opportunity to build up prior to discovery.

Upon entering the building, any unusual arrangement of the contents should be observed. There may be evidence of lack of stock or a substitution of stock. Sometimes new, expensive stock is removed and secondhand, old stock substituted for it. Following a severe fire, there might not be sufficient stock to make a difference.

If the building has an automatic sprinkler system, upon your arrival verify whether the sprinkler system was functioning properly? Was it controlling the fire? If not, why not? Were any valves closed that would have prevented the sprinkler system from operating?

As you proceed through the building, all fire doors should be noted. Were they open or closed? If open, were they blocked open or disabled? Was there any evidence that fire extinguishers or standpipe hose had been used to fight the fire? How did the the fire behave when an attempt was made to extinguish it? Did the fire spread more rapidly, resist extinguishment, or "bite back"? Did it spread over a larger area when hit with fire department hose streams? Did explosions result from attempts to extinguish the fire?

If the fire occurred at night, how were the occupants dressed? Were they wearing their best clothes? Did they seem to be acting normally for the situation? Were they calm? excited? hysterical? If the fire did not seem to bother them, some explanation might be in order. Details such as this may be of great value later.

Who turned in the alarm? Was the person still at the scene upon arrival of the fire department? Is this person the same one who discovered the fire? If not, who told the person turning in the alarm to call the fire department? Was the owner or occupant at the fire scene? How did the owner or occupant learn about the fire, if he or she was not present at the time of the fire? Who notified the owner or occupant? When fires occur at night or after working hours, an explanation of why the owners or occupants are or are not present could be important.

Firesetters of various types frequently remain near the fire scene and await the arrival of the fire department. Sometimes, they even assist the fire fighters in the extinguishment of the fire. The fire fighter should be aware of familiar faces seen at several fires. It is also wise to note anyone who seems unduly excited or who is taking an unusual or abnormal interest in the fire. Conversations or remarks overheard can be important. All this information should be passed on to the investigator as soon as possible.

The fire pump operator must usually remain in the vicinity of the pumper and therefore has little freedom of movement. People watching the fire may wish to talk with or be near such a person. Conversations between spectators can be very revealing. Many pump operators have been able to give the investigator leads as a result of these observations.

During and After Overhaul

During overhaul, fire fighters should refrain from cleaning out or disarranging the premises any more than is absolutely necessary, particularly in the area of the origin of the fire. The area of origin is usually the most heavily damaged by the fire, probably the most burned out section of the building. Little additional damage is likely to result from not thoroughly cleaning up this area.

It is natural for the fire fighters to clean up damaged debris during overhaul. It is usually thrown into one of two areas. The first is out the window. Most insurance policies provide for debris removal from the premises. However, traditionally the fire service has considered that debris removal was good public relations. True, the homeowner appreciates it. But his gratitude is nothing compared to that of the arsonist. He knows that the public relations conscious fire fighter has buried the evidence of his crime under a pile of burned rubbish out in the yard.

The second area used for the disposal of badly burned or water-damaged debris is the heavily burned area of the origin of the fire. This is the area that the fire investigator must examine most carefully. The presence of this additional discarded and damaged debris creates a twofold problem. It will require that all the material be moved again; and it will create uncertainty as to exactly what was present at the time of the fire and what was discarded during overhaul.

The fire fighter must be careful to check whether there has been any tampering with the utilities. Also, are all pets accounted for? Sometimes pets are removed prior to the fire. Have family heirlooms been removed from the premises? Family pictures, wedding pictures, and wedding albums? The better clothing belonging to the family, particularly to the children, may have been removed.

Many things that may be observed by the fire fighter are of interest to the investigator - multiple fires, odours, undue wood charring, uneven burning, inoperative sprinklers, tracks, footprints, evidence of a burglary, and so on. In addition, the fire fighter may be the first to recognize trailers set between the multiple fires. These include string or cord that has been soaked in oil or wax; streamers of paper, toilet paper, or newspapers; excelsior; and other combustible and flammable materials.

If the fire fighter discovers some objects that might be considered physical evidence, what is the procedure he should follow? First, if at all possible, it should be left where it is if there is no danger that the object will be damaged or destroyed. All should agree as to what it is and exactly where it was found. Its removal will be handled by the people conducting the investigation.

The fire fighter who may be on the scene long before the investigator arrives, must become the eyes of the investigator. Observation of unusual and unnatural conditions at the fire scene are the key to fire investigation.

The Value of Observation by fire department Officials at the fire scene, is immeasurable. Your assistance is very important to our investigation.

Arson is, without a doubt, the most difficult crime in the Criminal Code in which to secure a conviction.

In order to obtain a conviction of this type of crime, an investigator must, use all the "know-how", and the skill and all the knowledge he has accumulated and co-operate, without reservation, with Fire Department Officials, Police officers, Insurance adjusters.

We want you to understand there is a difference between investigation and detection or observation.

According to the dictionary, the word "Investigate" means to "follow-up" or "make research by patient inquiry and examination of facts". "Detection" is defined as "the act of uncovering, revealing, discovering the character or action of, or discovering the existence, presence, or fact of something hidden or obscured".

The foregoing definitions clearly draw a definite line between investigation and detection. Detection being the revealing or discovering of certain evidence or facts, and investigation the follow-up, research and inquiry into the evidence or facts revealed. In our view, Fire Department personnel come under the heading of what we may call "Detectors" or "Observers". You are the one that holds the key because you initiate the investigation.

We do not believe we should "fool" ourselves, to the premise that with regard to fire or arson investigation, the investigation of fires is simple, that is far from the truth. It takes years of study, research, reading and most important, experience, to become what would be considered a reasonably good arson investigator, and one of the fundamentals of their initial training is to require the knowledge of accurate detection or observation.

All fire officials should keep in mind that there are four points to consider. One - on the approach to and the arrival at the fire; two - the entry into the building; three - the extinguishment of the fire; and four - the picture of conditions immediately after the fire has been extinguished.

As in fire extinguishment, so in the value of observation, the initial stages of a fire are all important. Fire Department and frequently, Police officials, are in an ideal position for accurate observations in that they are the first, or certainly one of the first, to arrive at the scene of the fire.

We realize that the duty of your Fire Department is first and foremost the saving of human lives, containment and extinguishment of the fire and we can easily imagine what must be in the minds of fire fighters on their way to and approaching the scene of a fire. Such questions as, "Is anyone trapped in the building" and "How many". Your mind is pre-planning your actions. Your job is to prevent the loss of life and to extinguish the fire.

It is only natural that your powers of observation in any other direction is subordinate to this primary work and it is for this reason that we stress that accurate detection or observation is not obtained overnight. It is really, the simultaneous application of a second sense.

Certain conditions may be noted as an approach is made to the scene of the fire. Here are the three most important.

1. Any unusual movements of person or persons and vehicles from the direction of the scene of the fire.

2. The colour of the smoke emitting from the fire.

3. The size and spread of the fire.

The first condition is more or less self-explanatory, but such incidents as a person or persons running away or a speeding vehicle. At the scene of the fire, the unusual or peculiar actions of an onlooker or the fact that the same person has been seen at a previous fire or fires could be observation points of great value.

The second condition relative to the colour of the smoke, may, under certain conditions, indicate to the keen observer, the fact that certain substances are burning or are present within the building.

I would suggest to you that smoke is important only in the earlier stages of a fire, but as the fire expands and has progressed to a great degree from its time of ignition, much or all of smoke value, as evidence, is lost.

Smoke is the gaseous products of burning organic materials and is composed of hydrogen, combustible gases and small particles of ash, which finally settle as soot.

Black smoke may indicate the presence of flammable liquids in a fire that has not yet obtained enough air to enable it to reach its full ignition state. Black smoke also indicates an excess amount of unburned carbon. Both conditions are somewhat similar.

White smoke indicates the presence of water in contact with hot combustible substances. It may be noted, as example, when water from hose streams reach the seat of a fire and the water evaporates into great clouds of steam or what appears to be white smoke. Hot flames in contact with very wet or damp substances, produce the same effect.

Heavy, dirty grey coloured smoke which contains quantities of ash and soot, would possibly indicate the burning of such substances as hay or straw.

The burning of certain acids, celluloid, or films would produce yellow or reddish brown coloured smoke.

The third condition to be observed during the approach to the fire is the size, spread, colour and direction of the flames. This particular observation, I would suggest, should be assessed as to its value, after the fire has been extinguished, and when an inspection is being made of the interior of the building. As an example, the type and location of the contents not checking out with the excessive spread of flames that was observed and which could indicate the use of accelerants.

We have dealt with the approach to, and arrival at, the scene of the fire, and now we are at the point at which fire personnel enter the structure.

Importance of observations in this regard would be the conditions pertaining to the doors and windows. Had the doors been forced or broken open? Was any one door open or partly open? Was a padlock or any door hooked onto the latch but not snapped in the locked position? Were the windows wide open or partly open? Were any windows forced or broken? Were any windows covered? Is there any evidence of forcible entry?

Any or all of these points may be of the utmost importance in a subsequent investigation.

On entry to a building and while still fighting the fire accurate observations of interior conditions at this time by Fire Department personnel is of vital importance. Some of these observations are as follows:

1. Location of greatest intensity of flames.

2. If there appears to be two or more unconnected and separate fires. This observation, to be accurate and of value takes some thought and study. What appears to be two or more unconnected fires may be noted, but could have resulted through falling or flying burning debris or embers or other explainable conditions such as ignition temperature from the main area of fire being enough that when moved to an adjacent area by draughts of air, ignition of combustibles in this area takes place. The observation point of value is that two or separate fires have occurred with no possibility of accidental or normal connection between them.

3. Has directed hose streams intensified the flames at a particular point of area?

4. Was there anything unusual about the amount or position of the furniture or other contents?

5. In the case of stores or warehouses, was there a concentration or lack of merchandise?

6. Were there any peculiar odours or was there a definite odour of any inflammable substance which normally should not be present, taking into consideration the type of occupancy of the building.

Any or all of these observations could be of great importance and value to the investigator.

How should any member of the Fire Department observe any of the foregoing or other conditions which arouse suspicion that the fire may be of incendiary origin, it is his duty to see that as much care as possible is exercised in the use of hose streams in order that any evidence or any condition which existed within the building prior to the arrival of the Fire Department may be preserved or disturbed as little as possible for subsequent examination and analyses of the investigator.

While a fire of major proportion and/or the necessary use of high volume and pressure, hose lines can and will change or eliminate the picture of conditions that existed prior to and at the time of ignition. The careful use of hose streams may preserve and protect, to some degree, what could be vital physical evidence to the investigator.

Let us now come to the point where the fire has been extinguished, and for some reason, suspicion has been aroused during the extinguishment of the fire. What are the Fire Department officials to observe or look for?

The scene of the fire holds the key to the point of origin and to the physical evidence, if it has not been destroyed, that could indicate the cause of the fire.

We are assuming here that the building and contents have not been destroyed, for if this were not the case and nothing but a pile of rubble and ashes remain, we would suggest that the investigator should take over from this point, for with this condition existing observations and detection ceases and investigation begins.

When an investigator is faced with these conditions, one does not have to stretch the imagination very much to understand why the accurate observations of Fire Department officials are of such value.

The picture now is this: The building is still standing, the contents have not been completely destroyed, and the investigator has not yet arrived on the scene.

In this case, as in the case of what appears to be a routine accidental fire, the next step of Fire Department officials is to look for the area or point of origin. But because some factor has aroused suspicion greater care has to be exercised.

When endeavouring to locate the area of point of origin take into consideration the time of approach and arrival at the fire, the time of entry into the building, and the time during the extinguishment of the fire. The observations made during these times could be most helpful.

Before going any further, remember, to make observations of value while locating the area or point of origin and ascertaining the possible cause of the fire, the basic knowledge of fire itself must be clearly understood that fire is composed of three essential elements:

1. Any matter which will burn

2. Ignition heat or temperature

3. Air

Having assumed that the Fire Department officials have located what they consider to be the point of origin, the next observation should be physical evidence, if any, which might indicate the cause of the fire.

This physical evidence, may be destroyed or partly destroyed, and so the knowledge of fire causes is essential.

Assuming that your suspicions have not been aroused and conditions since the time of the Fire Department has arrived until the time the fire has been extinguished, conditions point to an accidental fire. Basic knowledge of the causes of fire and your normal powers of observation should, coupled with the help of the physical evidence available, enable you to arrive at a reasonable conclusion as to the cause of the fire.

During the course of extinguishing the fire and each accidental or normal cause has been eliminated, <u>then</u> and <u>then</u> only, is it time to "take stock", so to speak, and begin to consider the possibility of arson.

If this possibility has been decided upon or when earlier conditions at the fire have indicated that the fire may be incendiary, then extreme care should be taken in protecting the scene of the fire for the scene of the fire holds the key to the answer, and the area of origin wherein <u>must</u> be any physical evidence that is left, should not be disturbed in order that a true picture of conditions awaits the investigator on his arrival.

At this point, you or the police authority call for a Fire Investigator.

Your continued assistance and cooperation is necessary in order that we may assist your department and community in the investigation of those fires of a suspicious and/or of an incendiary nature.